

## CLAIMS

What is claimed is:

1. An isotropic vector field decomposition method for use in scientific computations comprising the steps of:
  - a computational grid modeled on a specific arrangement of nodes, such that each node is equidistant from its twelve nearest neighbors (this basic arrangement forms a VE cell, and the grid that is produced is hereafter referred to as an isotropic vector matrix (IVM));
  - a vector field decomposition technique utilizing six vector components at every node within the VE cell and the associated IVM grid; and
  - techniques for implementing standard vector calculus operations within the basic VE cell and the associated IVM grid.
2. An isotropic vector field decomposition method for use in scientific computations as claimed in claim 1 wherein said techniques can be used to create an algorithm to solve computational electromagnetic problems.
3. An isotropic vector field decomposition method for use in scientific computations as claimed in claim 1 wherein said techniques can be used to create an algorithm to solve computational fluid dynamics problems.

4. An isotropic vector field decomposition method for use in scientific computations as claimed in claim 1 wherein said techniques can be used to create an algorithm to solve computational acoustics and computational aeroacoustics problems.

5. An isotropic vector field decomposition method for use in scientific computations as claimed in claim 1 wherein said techniques can be used to create an algorithm to solve any general problem which includes the use of vector field quantities.

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